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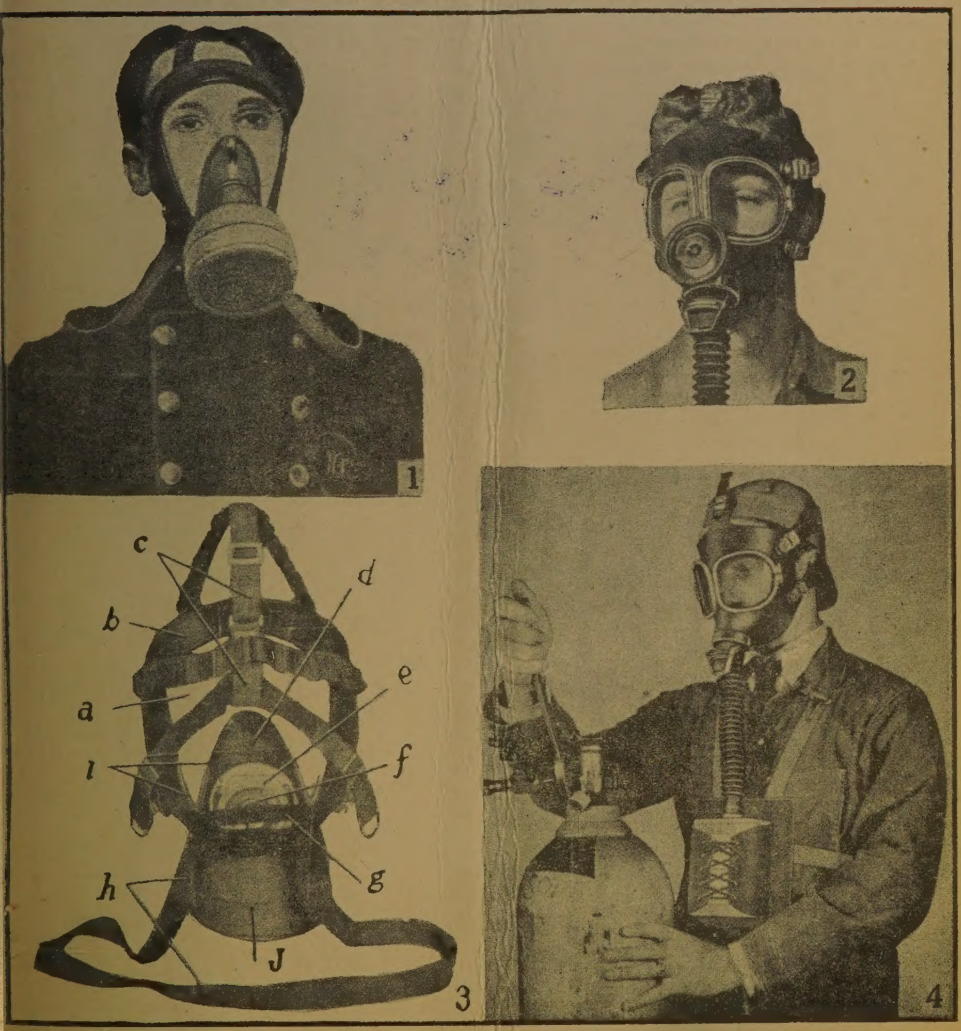
MINISTRY OF FOOD AND AGRICULTURE, GOVERNMENT OF INDIA

PLANT PROTECTION BULLETIN

SCIENCE IN PRACTICE



ISSUED BY THE PLANT PROTECTION ADVISER TO THE GOVERNMENT OF INDIA, NEW DELHI

COVER ILLUSTRATIONS

Fig. 1. A man wearing a full-view gas mask manufactured by S.F. Roberts Ltd., of London.

Fig. 2. A man wearing an Industrial gas mask having a clear tone speaking diaphragm face-piece manufactured by Mine Safety Appliance Co. of U.S.A.

Fig. 3. A full view gas mask manufactured by S.F. Roberts of London showing its different parts. (*a*) Transparent body of gas mask. (*b*) Air-tight sealing frame. (*c*) Head bands. (*d*) Frame of mask body. (*e*) Connecting piece to filter. (*f*) Breathing out valve. (*g*) Chin support. (*h*) Carrying band. (*i*) Retaining grooves for clear sight window. (*j*) High capacity filter.

Fig. 4. A man wearing an Industrial gas mask manufactured by Pulmosan Safety Equipment Corp. of U.S.A. (Courtesy of the manufacturers mentioned above).

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NOTE

This Bulletin is intended to disseminate information about plant protection measures and campaigns adopted or conducted in different parts of India as well as about the advances made in the field of plant protection in other parts of the world to the extent possible. It is also intended to give information about the latest developments in the production of pesticides, plant protection equipment and techniques of pests and plant disease control. Elaborate scientific papers on Entomology or Plant Pathology or on the Chemistry of pesticides would normally not be in place in this Bulletin but short notes dealing with the behaviour or distribution of pests and plant diseases and brief reports on their epidemiology, control, etc., would be welcome. Plant protection has now become such a specialised science and yet is so diversified and consequential in its character and application that it is difficult to define the scope of the subject with any great precision. The general rule to be observed is that any information which can be useful in preventing or controlling damage to crops, fruit trees, plantations and stored agricultural commodities caused by pests and diseases should be a fit subject for publication in this Bulletin.

Manuscripts submitted for publication in the Plant Protection Bulletin must be typed in double spacing on one side of the paper only, leaving ample margin on the left, at the bottom and on the top of the page. Photographs or drawings must be accompanied by a clearly typed legend which should appear under them. In addition, they should bear on their reverse in clear handwriting in pencil the name or names of the author or authors and the article which they illustrate. While this Directorate will take every care to include only such material in the Bulletin as may be considered reasonably correct and useful, it can accept no responsibility for every statement made and every opinion expressed.

Due to various unavoidable reasons the appearance of this Bulletin has been far behind the scheduled time. While this must be greatly regretted, every effort would be made to avoid delays in future. Those who may read this Bulletin are invited to offer criticisms and suggestions for its improvement.

K.B. Lal

Plant Protection Adviser
to the Government of India

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GAS MASKS AND THEIR USE IN FUMIGATION WORK

By

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Introduction

There are three common types of respiratory equipment, *viz.*, mechanical filter respirators, chemical filter respirators and gas masks. The former two are used against harmful insecticidal dusts and mists while the gas masks are used when dangerous organic insecticides and fumigants are applied in enclosed spaces.

Disinfestation of plant materials by fumigation, particularly in connection with plant quarantine work is becoming more and more a necessity as a number of importing countries are insisting on fumigation certificates to accompany consignments of plants and plant materials. In earlier years, fumigation used to be carried out in India in wooden boxes using Hydrocyanic acid gas generated by the pot method. The use of gas masks for preventing accidental poisoning was unknown in those days. In the introduction of modern methods of fumigation in this country, the Directorate of Plant Protection, Quarantine and Storage has played an important part. Plant Quarantine Stations that are being established at different ports in India are being equipped with modern steel atmospheric and vacuum fumigation chambers as well as all other equipment, including gas masks with appropriate canisters, necessary to prevent accidental poisoning. As a number of State Entomologists, Plant Pathologists and other officers are being authorized to issue phytosanitary certificates and are modernising their fumigation equipment, they will, no doubt, be interested in learning about gas masks, to enable Government and private fumigation operators to work in comfort and safety.

Construction of Gas Masks

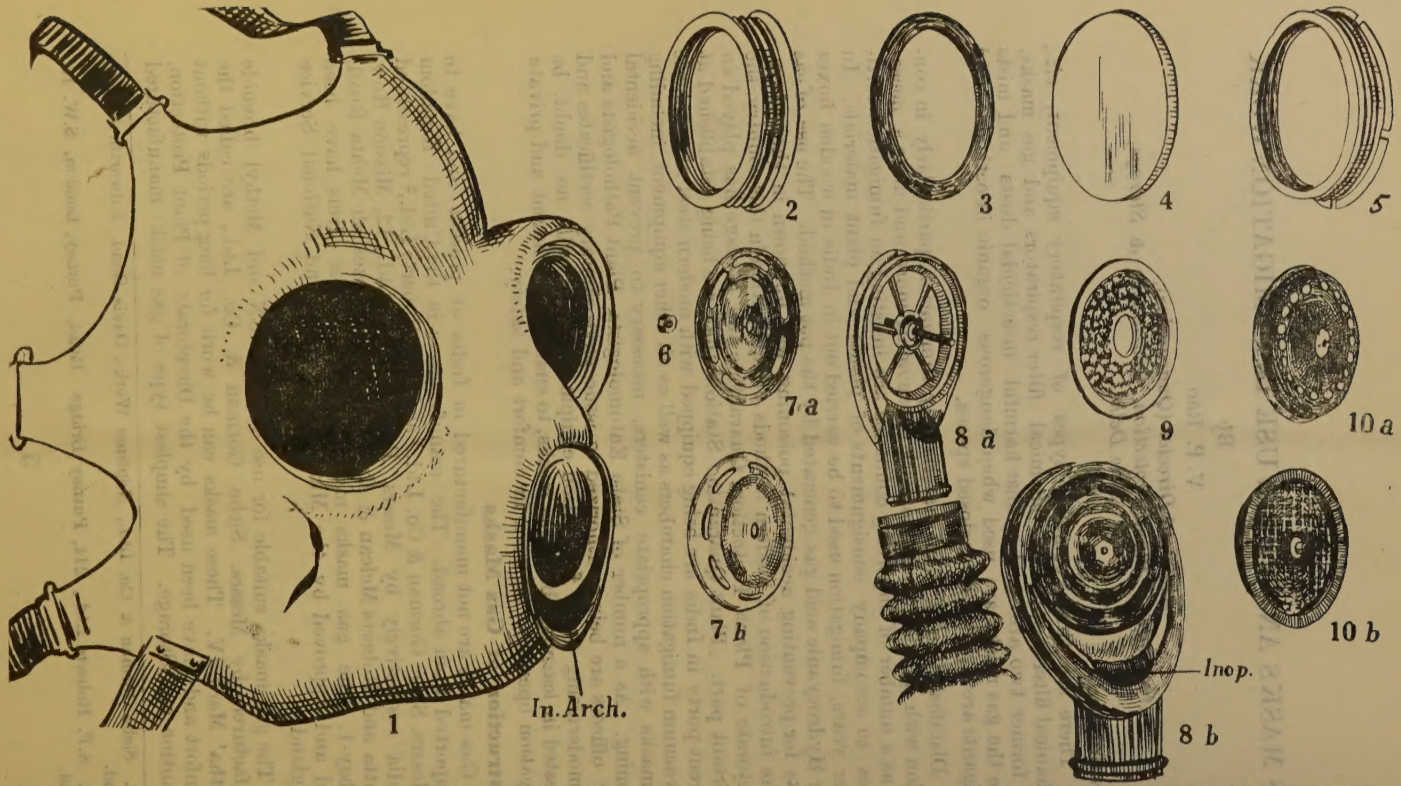
Gas masks are not manufactured in India at present and have to be imported from abroad. The manufacturers in the United Kingdom are Messrs. Siebe Gorman & Co. Ltd.,[1] and S.F. Roberts Ltd.,[2] represented in India respectively by Messrs. Burn & Co. Ltd., 12, Mission Row, Calcutta and Roberts Mclean & Co. Ltd., Sir Pherozeshah Mehta Road, Bombay-1. The gas masks manufactured by these firms have been tested and approved by the Ministry of Labour and National Service in England.

The gas masks suitable for use against HCN and Methyl bromide manufactured by Messrs. Siebe Gorman & Co. Ltd., are called the 'Puretha' Mark IV. These masks can be worn for long periods without discomfort and have been used by the Directorate of Plant Protection, Quarantine and Storage. The simplest type of gas mask manufactured

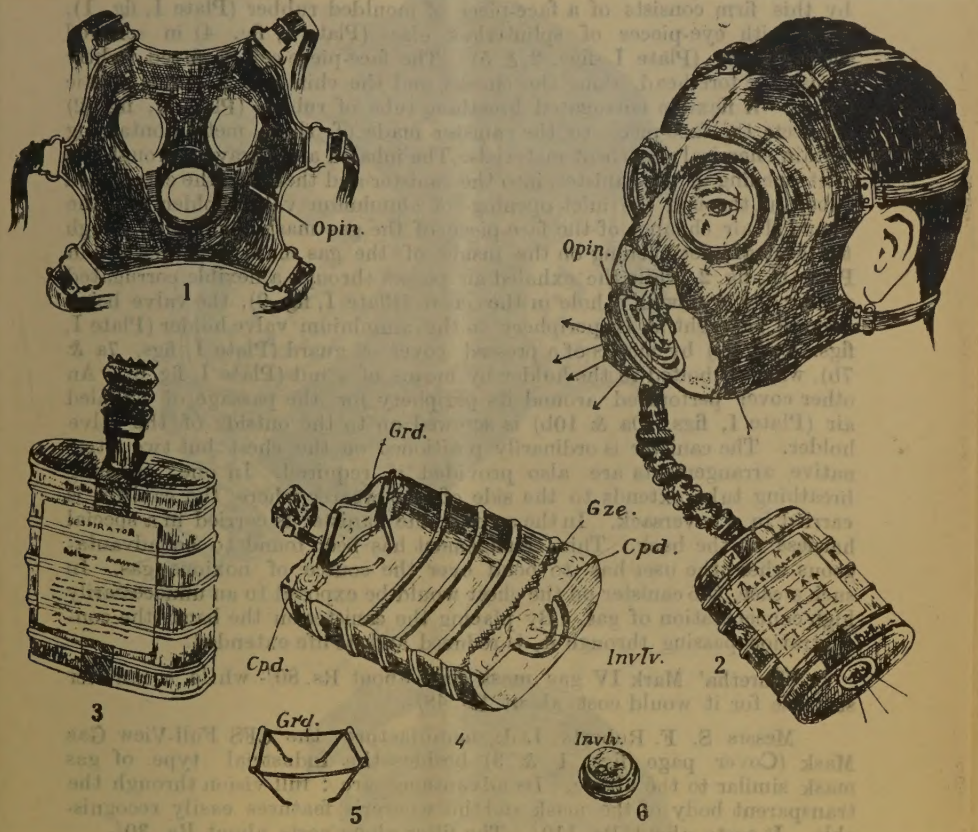
1. Siebe Gorman & Co. Ltd., Neptune Works, Davis Road, Tolworth, Surrey, England.

2. S.F. Roberts Ltd., 214, Putney Bridge Road, Putney, London, S.W. 15, England.

Plate I



1. Face-piece of gas mask showing air channel (In. Arch.) for inhaled air and cavities for fixing eye pieces. 2. & 5. Metal frames to hold eye-piece. 3. Rubber ring of eye-piece frame. 4. Eye-piece. 6. Nut for fixing pressed cover or guard to the valve holders. 7. (*a*) & (*b*) Pressed cover or guard fixed to the valve holders. 8. (a) Aluminium valve holder as seen from outside and a portion of the corrugated rubber tube. 8. (*b*) Aluminium valve holder as seen from inside. Note the inlet opeing for inhaled air (Inop.). 9. Rubber valve showing the opening for exhaled air. 10. (*a*) Outer cover for passage of exhaled air as seen from outside. 10. (*b*) Outer cover for passage of exhaled air as seen from inside.



1. Gas mask as seen from inside showing the opening for inhaled air (opin.).
2. Side view of a simple Industrial gas mask showing the flow of incoming air through the canister during inhalation cycle and outcoming air during exhalation cycle. A portion of the gas mask has been cut to show the valve holder and escape holes for exhaled air.
3. Side view of a canister as seen from outside.
4. A section of an empty canister showing its construction. Cotton pads (cpd.) and wire gauze(gze.) are present at the bottom and cotton pads and a wire guard on the top.
5. Wire guard (grd.) on the top of the canister.
6. Metal cap for the inlet valve (Invlv.) at the bottom of the canister.

by this firm consists of a face-piece of moulded rubber (Plate I, fig. 1), fitted with eye-pieces of splinterless glass (Plate I, fig. 4) in screwed metal frames (Plate I, figs. 2 & 5). The face-piece can be fitted tightly across the fore-head, along the cheeks and the chin by adjustable elastic straps. A flexible corrugated breathing tube of rubber (Plate II, fig. 2) connects the face-piece to the canister made of sheet metal containing certain chemical absorbent materials. The inhaled air is drawn through the inlet opening of the canister, into the canister and then into the corrugated tube and through the inlet opening of aluminium valve holder into the moulded air channel of the face-piece of the gas mask and then through the central inlet opening on the inside of the gas mask as indicated in Plate II, fig. 2, while the exhaled air passes through a flexible corrugated rubber valve having a hole in the centre (Plate I, fig. 9), the valve being secured gas-tight at its periphery to the aluminium valve holder (Plate I, figs. 8a & 8b) by means of a pressed cover or guard (Plate I, figs. 7a & 7b), which is bolted to the holder by means of a nut (Plate I, fig. 6). An other cover perforated around its periphery for the passage of exhaled air (Plate I, figs. 10a & 10b) is screwed on to the outside of the valve holder. The canister is ordinarily positioned on the chest but two alternative arrangements are also provided if required. In one, the long breathing tube extends to the side of the wearer where the canister is carried in a haversack. In the second, the canister is carried in a special harness on the back. This arrangement has been found to be advantageous when the user has to bend over the source of noxious gas. In such a case, the canister on the chest would be exposed to an unnecessarily high concentration of gas. By placing the canister on the back, the concentration passing through it, is reduced and its life extended.

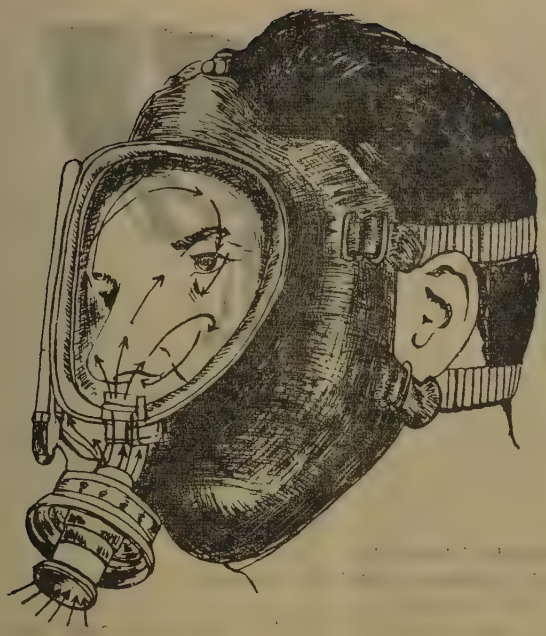
'Puretha' Mark IV gas mask costs about Rs. 80/- while a canister suitable for it would cost about Rs. 48/-.

Messrs S. F. Roberts Ltd., manufacture the CFS Full-View Gas Mask (Cover page figs. 1 & 3) besides the Industrial type of gas mask similar to the above. Its advantages are : full vision through the transparent body of the mask and the wearer's features easily recognisable. It costs about Rs. 110/-. The filter alone costs about Rs. 30/-.

In U.S.A., the Bureau of Mines is the official testing agency for gas masks and it has set up a schedule whereby gas masks submitted for approval and found to meet the minimum requirements are awarded an approval number. Amongst the manufacturers whose gas masks have been approved by this Bureau are Mine Safety Appliances Co.,[1] Acme Protection Equipment Co.,[2] Wilson Products Inc.,[3] and Pulmosan Safety Equipment Corporation.[4]

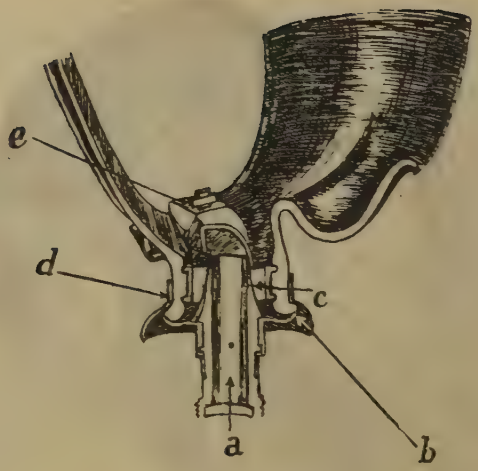
Acme Protection Equipment Company of U. S. A. have placed on the market full vision gas masks. Their No. 6 face-piece is specially designed to reduce breathing resistance and has also a new type of dead air check valve which promotes safety by limiting the amount of carbon dioxide the wearer rebreathes by closing at each exhalation and pre-

1. Mine Safety Appliances Co., Braddock, Thomas and Meade Sts., Pittsburgh 8, Pa. (U.S.A.).
2. Acme Protection Equipment Co., 1201 Kalamazoo St., South Haven, Michigan, (U.S.A.).
3. Wilson Products, Inc., Reading, Pa. (U.S.A.).
4. Pulmosan Safety Equipment Corp., 1007, Washington Avenue, St. Louis. Mo., (U.S.A.).



Text fig. 1

Text fig. 2



Text fig. 3

(*a*) Entrance for inhaled air.

(*b*) Valve lip permitting exhaled air to get out.

(*c*) Exit tube for exhaled air.

(*d*) Special clamp protecting the valve and at the same time eliminating resistance.

(*e*) Dead air check valve which closes at each exhalation, preventing exhaled air going down the intake passage towards the canister.

venting dead air going down the intake passage towards the canister or hose to be rebreathed at next inhalation and thereby increasing the wearer's confidence because he can always see this operate. The new inhalation valve assembly is built as one simplified fitting, providing large equal areas for both incoming and outgoing air (Text figs. 1 and 2). The valve design is such that the curved valve lip closes progressively from lip to throat on inhalation and opens progressively from throat to lip with minimum resistance on exhalation and also provides for direct line of air flow without obstruction, permitting increased audibility of speech so that no special speaking device is necessary when these gas masks are used.Text fig. 3 is a sectional illustration of right half of the face-piece indicating the important parts of the valve assembly. In Text fig. 1 is shown the flow of incoming air during inhalation. Air enters through the central duct of the valve assembly raising the scoop type dead air check valve and travels directly against the inner surface of the lenses before reaching the nostril. In Text fig. 2 is shown the exhalation cycle during which the dead air check valve is closed automatically and outgoing air passes unobstructed through the valve assembly, gently crowds the valve away from its seat and gets out through the guard as indicated by arrows. This firm manufactures gas masks of several styles according to requirement *viz.*, (1) chest style mask with canister of 750 cc. size for most gas protection needs where a known gas or combination of gases is encountered or 1600 to 1900 cc. size for conditions where longer canister life is needed and (2) Gauger's style mask with canister of 1600 to 1900 cc. size at the back for any job where concentration of gases will be less at the back of the wearer. For plant quarantine work, type (1) is sufficient and costs $ 32.00 (with a canister). The canister alone costs $ 3·75.

Gas masks manufactured by Mine Safety Appliances Company, Wilson Products Inc., and Pulmosan Safety Equipment Corporation are also popular in U.S.A. for use against poisonous gases. These gas masks also have all-vision face-piece which permits unobstructed vision through normal viewing angles contributing greatly to the efficiency of the wearer. The extra contoured lenses are made of shatter-proof glass and are replaceable. The built-in fog proof construction prevents moisture on lenses while the minimum dead air space in face-piece cuts down rebreathing of exhaled air. The face-piece is of moulded special rubber assuring an easy comfortable and gas-tight fit on any face. The prices of these gas masks at present are as follows :—

Mine Safety Appliances Industrial Gas Mask complete with canister in fibre carrying case	..	$ 32·00
Canister only	..	$ 3·75
Wilson Products Inc., WIG-GID Gas Mask complete with canister in carton	..	$ 24·00
Canister only	..	$ 3·75
Pulmosan Safety Equipment Co., Industrial Gas Mask complete in fibre carrying case	..	$ 32·00
Canister only	..	$ 3·75

Use and Care of Gas Mask.

A gas mask in good condition with fresh canister appropriate to the fumigant being employed should always be worn during fumigation or subsequent inspection, although ordinarily it may not be necessary for a fumigation operator or quarantine inspector to examine fumigated

Text figs. 4 to 9.

material until it has been thoroughly aerated. Care should be taken not to expose the gas mask canister beyond its known capacity. Even with a gas mask, one should not remain in a fumigated place more than the period required for necessary work or inspection.

Detailed instructions for the use and care of a gas mask are usually given on the inner surface of the lid of its container, by the manufacturer. These instructions should be thoroughly read and digested before any person puts on the gas mask and takes up the responsibility for its care. The maintenance of a gas mask in good operating condition should be considered as the duty of the person who has to use it. He should store the mask in its container in a cool, dry and well-ventilated place. As light deteriorates rubber, it is advisable not to store the gas mask in a glass-front case. If by chance it becomes wet, it should be dried immediately. Before the gas mask is taken out for use, it should be checked carefully and if it had been used by any person earlier, it should preferably be disinfected. In wearing a gas mask for use in a poisonous atmosphere, a fumigation operator should make sure that the concentration of fumigant is below the capacity of the canister to remove the vapour and that the absorption of the gas through the skin at that particular concentration is not possible. Gas mask of the canister type should not be employed in an atmosphere deficient in oxygen. Some gases such as Ethylene oxide and Methyl formate and occasionally Methyl bromide are mixed with Carbon dioxide and supplied in cylinders. As these mixtures contain considerable percentages of CO_2 which when released in the air decrease the percentage of oxygen below the safety limits resulting in suffocation and rapid breathing, gas masks and canisters cannot be used when fumigation doses of such mixtures are used. However, gas masks and canisters can be used under conditions of low concentration of these mixtures such as those occurring during aeration.

How to Wear the Gas mask

For wearing a gas mask, the following steps may be observed :—

Firstly, put your chin in the gas mask (Text fig. 4). Then pull the straps over your head and adjust the mask on the face (Text fig. 5). The next step is to pull up and adjust the temple strap (Text fig. 6). Then pull up the fore-head straps (Text fig. 7). After this, pull up the neck straps (Text fig. 8). Now test the mask for tightness. This can be done by pinching the hose and inhaling (Text fig. 9). The mask will collapse if perfectly tight. Leakage at the side of the face indicates that the temple strap is too low on the ball of the head. Leakage at the fore-head indicates that the temple strap is too high. Always loosen the neck and fore-head straps when adjusting temple straps. To remove a gas mask, hook thumbs under the face-piece at chin pulling forward and upward.

Life of Mask and Hose

As considerable parts of the gas mask are made of rubber, the length of their service and the necessity of their replacement are significant points for consideration from the stand-point of human safety. No hard and fast rules can be laid down as regards the length of time a gas mask can be used. A face-piece and hose will last, depending on a number of factors such as the quality of the rubber used by the manufacturers of the gas mask, the use it is put to, exposure to moisture, sun and heat and storage conditions. In temperate climate, the rubber of the gas mask has been found to deteriorate after five years but

in tropical conditions, the deterioration may take place very much earlier. The gas mask should, therefore, be checked thoroughly from time to time. Break down in a rubber part is clearly visible. Leaks in the hose connection can be demonstrated during the test for tightness by pinching the hose at different places and by careful visual examination. If a crack or hole appears in the face-piece or hose, an immediate replacement should be made. Such breaks should not be patched or sewed under any circumstances. As old rubber stretches and loses its elasticity, no air-tight fit can be secured around the face with deteriorated face-pieces of gas mask as can be demonstrated by the tests for tightness.

The Canister—Its Use and Care.

Canisters are light metal bottles with a narrow opening called the hose nipple on the top and an inlet valve covered by a metal cap at the bottom (figs. 3 to 6, Plate III). They contain three elements *viz.*,

(*a*) Activated charcoal to take up organic vapours such as Methyl bromide.

(*b*) Soda lime, Caustic pumice or Caustite which is a Sodium hydroxide preparation and activated charcoal to neutralise acid gases such as HCN.

(*c*) Cotton filters for dust.

Manufacturers usually paint the outside of the canisters with particular colour designs so that one could easily recognise the fumigant against which it provides protection. For example, the canisters manufactured by Messrs. Siebe Gorman Co., of type "O", coloured black with an orange stripe, are for use against Methyl bromide and type "D" coloured white are for use against HCN.

Manufacturers of the canisters usually state on each canister that they are not to be used in concentrations above 2% by volume of the toxic gas in the air. In the case of Methyl bromide, this is equivalent to 5 lbs. per 1000 cubic feet and in the case of Hydrocyanic acid gas 22 ounces per 1000 cubic feet. Actually, however, it is only good in such concentrations for a very limited time. Investigations have shown that at 0·4% concentration by volume, the canister is good for a maximum of 2 hours (1 lb. per 1000 cubic feet for Methyl bromide and 4 ounces per 1000 cubic for Hydrocyanic acid gas). Therefore, the use of canister is ruled out for concentrations of gas involved with fumigants requiring high doses. For example, the Ethylene dichloride-Carbon tetrachloride mixture is recommended at doses of 14 lbs. or over per 1000 cubic feet. At this dose, the percentage concentration by volume is 4·8. This would mean that the canister cannot offer protection against this gas. In India, as a fumigated space or chamber is generally entered only after proper aeration, the concentrations mentioned above would normally not occur. Nevertheless, these facts emphasize the need for the regular replacement of canisters during fumigation operations on account of their limited life. In replacing canisters it is advisable to obtain them from the manufacturer supplying the mask, although they may be interchangeable.

Fumigation operators must bear in mind the following points for the care and the renewal of canisters:—

(1) As soon as a canister is received, mark the date on a special tag or label placed in a readily visible place such as the shoulder of the canister where it can be easily seen even after placing the harness.

(2) If the canister is not exposed by removing the cap over the inlet valve and the cork covering the top opening or the hose nipple, keep it in a cool, dry, well ventilated place away from any gaseous fumes. It can then be stored upto 2 years without deterioration.

(3) Immediately after the cork on the hose nipple is removed for placing in the gas mask, mark the date on the tag or label.

(4) If the canister is not exposed to poisonous gas after opening the cork, it can be retained in the mask for one year provided it is stored carefully as suggested above.

(5) Before the mask can be used, it is necessary that the cardboard cap over the inlet valve is removed. At this time, the date must again be marked on the tag or label. Once the cap is removed, the canisters should ordinarily be replaced after six months.

(6) Where there is exposure to high concentrations of fumigant for even short periods, the canister must be discarded and a fresh one installed in the mask. For lower concentrations such as might be encountered during aeration or inspection of fumigated structures, the canister must be replaced after a total exposure of two hours to the the gas. It is advisable to keep a record of such exposures on the tag.

(7) Canisters showing any external sign of damage must be discarded immediately. Severe blows on the metal container may cause displacement of the charcoal or other contents permitting contaminated air to pass directly to the wearer. The canisters should, therefore, be handled with care and not be dropped down.

(8) As immersion of the canister in water renders it useless, care should be taken during the cleaning or disinfecting of the gas mask to ensure that no water enters the hose connection. It may be advisable to separate the canister and to close its two openings by placing the metal lid at the bottom and the cork of the hose nipple while cleaning or disinfecting the gas mask.

A NOTE ON SOME NEW PESTICIDES TESTED IN THE MADRAS STATE

By

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Introduction

It is needless to lay any special emphasis on the fact that the availability of the synthetic chemicals, soon after World War II, has practically revolutionised the methods of plant protection in vogue in India. For quite some time, the import of insecticides, their formulation and distribution were the exclusive monopoly of one or two firms. Of late, a number of firms have entered the field, thus leading to a keen competition and reduction of the prices to a considerable extent. It has, therefore, become imperative that these formulations should be critically tested and suitable advice given to the extension agencies to enable them to choose the best amongst the different brands of insecticides in the market. The need for this has also been realised by the Planning Commission, who have made recommendations stressing the necessity for such tests. So far as the Madras State is concerned, the investigations are in charge of the Entomological Division of the Agricultural Research Institute, Coimbatore. The Department has prescribed a fee of Rs. 30-0-0 per sample of any preparation to be tested with the stipulation that an adequate quantity of the chemical should be supplied free of cost for such investigations by the interested firms. The insecticidal efficacy of these formulations is assessed with reference to suitable controls and standard pesticides in use for plant protection in this State. A careful watch is also kept on the adverse effects like phytocidal action, development of secondary infestation, etc., brought about by the application of these preparations. The information gathered so far is furnished in the following statement:—

Summary of Results

In all, 23 pesticides have been tested. The insecticidal efficacy of these proprietary formulations being more or less similar to that of the respective standards, the ultimate choice lies only in the price factor. Psylortox DDT emulsion is an improvement over wettable DDT, as the former has given a certain degree of control even against aphids and mites. However, this formulation has to be applied at a weak concentration so as to avoid any foliage injury. BHC miscible oil and Lindane miscible oil have definitely proved harmful under tropical conditions and it would, therefore, be advantageous to use only wettable formulations. Pestox 3H has been found to be effective particularly against aphids and mites. The results are quite encouraging with "Hyman compound 269" against a wide range of cotton pests.

In conclusion, it has to be admitted that the results presented in this note can at best be taken as indicative of the insecticidal efficacy of the various formulations. Their merits will have to be assessed critically under field conditions, during periods of a more severe incidence of the various crop pests.

Acknowledgements

Thanks are due to Shri V. Tirumala Rao, formerly Agricultural Entomologist and Professor of Entomology, under whose guidance the investigations were conducted and also to other members of the Entomological Section, who co-operated in the work.

Statement showing the pesticides tested in Madras State

Serial No.	Name of the firm submitting the formulation for test	Serial number of the sample tested	Proprietary name of the formulation tested	Standard used for comparison	Test insects used (both in the laboratory and field)	Evaluation of the formulation tested	Remarks
1	2	3	4	5	6	7	8
1.	Bharat Pulverising Mills, 38/A Sayani Road, Parel, Bombay	1.	"Hexamar" BHC 5% dust	"Gammexane" Dust D. 025	*Dysdercus cingulatus* F. *Prodenia litura* F.	As good as the standard pesticide	
		2.	"Hexamar" BHC 10% dust	"Gammexane" Dust D. 120	*Empoasca devastans* D. *Thrips tabaci* L. *Achoea janata* L. *Pericallia ricini* F. *Epilachna* spp. *Lytta tenuicollis* Pall.	-do-	
		3.	"Hexamar" BHC 50% wettable powder	"Gammexane" P. 520	*Dysdercus cingulatus* F. *Achoea janata* L. *Pericallia ricini* F. Termites *Longitarsus belgaumensis* F.	-do-	

1	2	3	4	5	6	7	8
		4.	"Hexamar" DDT 50% wettable powder	"Guesarol" 550	*Dysdercus cingulatus* F. *Empoasca devastans* D. *Thrips tabaci* Lind.	As good as the standard pesticide.	
		5.	"Hexamar" DDT 10% dust	"Guesarol" 410	*Dysdercus cingulatus* F. *Empoasca devastans* D. *Thrips tabaci* Lind.	-do-	
		6.	"Hexamar" Toxaphene 10% dust	"Geigy" Toxaphene 10% dust	*Achoea janata* L. *Earias* sp. *Calocoris angustatus* L. *Camponotus* sp. Psychids on Tamarind. Membracids on red gram	-do-	In general this chemical had a better residual action than BHC.
		7.	"Parathion" 15% wettable powder	"Ekatox-20"	*Saissetia nigra* Nietn. Ashweevils *Pseudococcus* sp. *Oryctes rhinoceros* L. Fly maggots (*Musca* sp.) *Aphis medicagenis* K.	-do-	The formulation emits a nauseating smell and almost suffocates the operator. On this ground the new formulation is considered not safe for use.

1	2	3	4	5	6	7	8
2.	Parry & Company Ltd., Post Box No. 12, Madras	8.	BHC 50% miscible oil	"Gammexane" P. 520	*Aphis gossypii* G. *Aphis medicagenis* K. Membracids.	As good as the standard pesticide	Under tropical conditions it is far safer to use wettable powders than oil emulsions as the applications of the latter formulation are fraught with phytocidal risks.
		9.	BHC 25% wettable powder	"Gammexane" P. 520	*Aphis gossypii* G. *Aphis medicagenis* K. *Saissetia nigra* Nietn. Membracids.	-do-	
		10.	Tetra Ethyl Pyrophosphate	Hexa Ethyl Tetraphosphate	*Aphis gossypii* G. *Thrips tabaci* L. *Aphis medicagenis* K. Membracids	-do-	TEPP can be preferred to HETP as the former has a slightly better residual action.
		11.	Lindane 10% miscible oil.	"Gammexane" P. 520	*Thrips tabaci* Lind. *Empoasca devastans* D. *Oecophylla smaragdina* F.		Though the insecticidal efficacy was as good as that of the standard, this chemical brought about a reduction in the yield of onions. It is, therefore, considered safer to adopt wettable formulations under tropical conditions. Studies on tainting indicated no adverse

1	2	3	4	5	6	7	8
							effects by the use of this chemical, while technical BHC imparted an objectionable smell to the produce of the treated plants.
		12.	Psylortox DDT emulsion	"Guesarol" 550	*Thrips tabaci* Lind. *Eupterote mollifera* Wlk. *Prodenia litura* F. *Epilachna* spp. *Achoea janata* L. *Pericallia ricini* Fb. *Aphis medicagenis* K. *Empoasca devastans* D. *Pseudococcus virgatus* Ckl. *Ripersia oryzae* Gr. *Tetranychus telarius* L.		As a spray at 0·1% concentration the chemical was superior to the standard.
		13.	Pestox 3H	HETP, Sulphur and Parathion	*Aphis medicagenis* K. *Tetranychus telarius* L. *Pseudococcus virgatus* Ckl.		As a spray at 0 075% to 0 15% strength, the chemical proved very effective against aphids, mites and a few species of mealy bugs.

1	2	3	4	5	6	7	8
3.	Shaw Wallace and Company, 4, Bankshell Street, Calcutta-1	14.	Sandotox (containing copper, sulphur and Rotenone)	"Gammexane" Dust D·025	*Eupterote mollifera* Wlk. *Prodenia litura* F. *Epilachna* spp. *Empoasca devastans* D. *Pericallia ricini* F.		Insecticidal efficacy was definitely inferior to that of the standard.
		15.	Thiovit (wettable sulphur)	Sulphur dust	*Tetranychus telarius* L. *Tetranychus hindustanicus* Hirst.		As a spray at 0.5% concentration the efficacy of this formulation as an acaricide was similar to that of sulphur dust.
		16.	Intox-8 (70% chlordane compound)	"Gammexane," P. 520 and Ekatox-20	*Alcides bubo* F. *Aphis* spp. *Earias* sp. & *Platyedra* sp. *Camponotus* spp. Membracids. *Schoenobius incertellus* W. *Ripersia oryzae* Gr.		As a spray at 0·05 to 0·1% the insecticidal efficacy was inferior to that of the standard pesticides tried.
4.	Agri-Orient Industries Ltd., Ebrahim Building, 98, Meadows Street, Bombay	17. 18.	"Benexide" BHC 5% dust "Benexide" BHC 10% dust	"Gammexane" Dusts D·025 and D·120	*Dysdercus cingulatus* F. *Epilachna* spp. *Prodenia litura* F. *Lytta tenuicollis* Pall.		As good as the standard pesticides.

1	2	3	4	5	6	7	8
5.	Messrs International Chemical & Testing Laboratories, Bombay-1	19. 20.	Kilex 501 Kilex 555	"Gammexane" P 520 and "Guesarol" 550	*Empoasca devastans* D. *Thrips tabaci* Lind. *Earias* sp. & *Platyedra* spp. *Aphis gossypii* G. *Dysdercus cingulatus* F. *Euproctis* sp. *Pseudococcus virgatus* Ckl. *Azazia rubricans* Boisd.		Both the chemicals proved quite effective against a wide range of cotton pests. Their performance was at par with those of the standard pesticides. Convincing results were not, however, obtained against the bollworms.
6	K.N. & Sons, No. 1, Virupaksheeswaran Street, Mylapore, Madras-4	21.	"Hortex" dust 0 65% (of M/S. E. Merck Chemical & Works, Germany).	"Gammexane" Dusts D.025 &D. 120.	*Prodenia litura* F. *Eupterote mollifera* Wlk. *Epilachna* spp. *Oecophylla smaragdina* F. *Thrips tabaci* Lind. *Empoasca devastans* D. *Lytta tenuicollis* Pall.		The insecticidal efficacy was at par with that of the standard. This formulation has certain advantages over BHC as it did not impart any taint to the produce of the treated plants. Further, no phytocidal effects were caused even on cucurbits. Particularly for treating vegetable and tuber crops this formulation is quite suitable.

1	2	3	4	5	6	7
7.	Geigy Insecticides Ltd., Neville House, Nicol Road, Ballard Estate, Bombay-1	22.	Product 1250	"Gammexane" P. 520.	*Dysdercus cingulatus* F. *Empoasca devastans* D. *Thrips tabaci* Lind. *Earias* spp. *Achoea janata* L. *Pericallia ricini* F. *Eupterote* sp. *Aphis gossypii* G.	The insecticidal efficacy of this formulation as a spray at 0.5 and 1% was almost equal to that of BHC 0·05 and 0·1%. This chemical is quite effective even against jassids, while BHC has a limited scope against these. It also had better residual action.
8.	Julius Hyman & Co., Denver, Colorado, U.S.A. (For the Deputy Secretary, Cotton Committee)	23.	"Hyman Compound 269"-Endrin.	"Guesarol" 550, HETP and Ekatox-20.	*Empoasca devastans* D. *Aphis gossypii* G. *Pseudococcus virgatus* Ckl. *Saissetia nigra* Nietn.	Even at a weak concentration of 0·01 and 0·02% spray the chemical was effective against a wide range of cotton pests. The insecticidal efficacy was more or less similar to that of the standard pesticides, but the residual action was longer.

SOME RECORDS OF PLANT DISEASE CONTROL WORK IN THE PUNJAB DURING 1953-54

By

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The work on the control of plant diseases in the State was intensified during 1953-54. The measures adopted against the various diseases are recorded below :-

Loose Smut and Ear-Cockle of Wheat. A state-wide campaign for the solar heat treatment of wheat seed was launched during May and June, 1954, and 46,082 maunds of wheat seed, sufficient to raise about 60,000 acres of smut-free wheat crop, were treated. Assuming that this will result in a 5% increase in yield, there will be a net saving of over Rs. 4,00,000/-. It is for the first time that such a large quantity of wheat seed was thus treated in the State.

In addition, 45,832 maunds of wheat seed were also freed from the ear-cockle galls by floatation. This treatment also is expected to result in an additional saving of Rs. 4,00,000/- to the farmers.

Stinking Smut of Wheat. This disease is very serious in the hills. As a preventive measure, 668 maunds of wheat seed, sufficient to sow about 900 acres, were treated with Agrosan GN. The crop, raised from treated seed, was free from bunt. As a result, a minimum saving of Rs. 10/- per acre was estimated.

Covered Smut of Barley. As a sanitary measure against this smut, diseased ears were rogued out from over 15,431 acres of the barley crop.

Early Blight of Potatoes. Ninety-eight acres of potato crop were sprayed with 4:4:50 Bordeaux mixture against this disease.

Potato viruses. Thirty-two acres of potato crop were sprayed against insect vectors to check the spread of virus diseases.

Black Scurf of Potatoes. Potato seed tubers weighing 1,639 maunds to be preserved in cold storage, were freed from black scurf organism by visual examination.

Citrus Canker. Citrus trees and nursery plants numbering 71,195 were sprayed against Citrus Canker with 4:4:50 Bordeaux mixture after pruning off the diseased branches and removing the diseased leaves. In addition, 82 acres of citrus nursery were also sprayed with this fungicide.

Anthracnose of Mango. Mango plants numbering 1,280 were sprayed with 4:4:50 Bordeaux mixture against this disease.

Die-Back of Chillies caused by *Vermicularia capsici*. Seven and a quarter acres of chilli crop were sprayed with Bordeaux mixture against this disease.

Sugarcane Smut. One acre of ratoon crop of sugarcane was freed from smutted stools, as a sanitary measure.

Bark Canker of Pears and Loquat Trees. A serious bark-canker disease of pears and *loquat* trees was observed in a number of orchards near Amritsar. Some 144 trees with 582 cankers were treated surgically and Bordeaux paste was applied.

Fungal Diseases (Unclassified). About 3,130 trees and 6,000 nursery plants of apples, peaches, plums and pears were sprayed with Diesel Oil-Bordeaux Mixture against San Jose Scale and various fungal diseases.

Fungicidal Treatment of Groundnut Seed. Fifteen maunds of groundnut seed were dusted with Ceresan @ ¼ lb./maund of seed as a protective measure against soil-borne fungi, *viz.*, *Rhizoctonia*, *Fusarium*, *Sclerotiam* and *Aspergillus* spp.

Alternaria Blight of Onions. Six acres of onion crop were sprayed with 3:3:50 Bordeaux mixture to keep the disease in check.

Powdery Mildew of Cucurbits. Seventeen acres of cucurbits were dusted with fine sulphur against the powdery mildew.

Orobanche sp. Plant parasite. Eight acres of *Orobanche* infested *taramira* crop were cleared of the parasite by destroying the plants (parasites) before the seeds matured.

PRINCIPAL LEPIDOPTEROUS BORERS OF GRAMINACEOUS CROPS IN INDIA*

In view of the existing confusion about the scientific names of the various species of Lepidopterous borers of graminaceous crops in India, the following list is published for the benefit of Plant Protection workers in this country :—

Species	Formerly recorded as	Common name	Crop
1	2	3	4
Pyralidae			
Crambinae			
1. *Ancylolomia chrysographella* Koll.	—	—	Rice
2. *Bissetia steniellus* Hmps.	*Chilo trypetes* Bisset	—	Sugarcane
3. *Chilo suppressalis* Wlk.	*Chilo simplex* Hmps.	Rice stem borer	Rice
4. *Chilo tumidicostalis* Hmps.	*Argyria tumidicostalis* Hmps.	—	Sugarcane
5. *Chilo zonellus* Swinh.	*Chilo simplex* Butl. *Argyria lutulentalis* Tams.	—	Maize, sorghum
6. *Chilotraea auricilia* Dudg.	*Diatraea auricilia* Dudg.	Stem borer	Sugarcane
7. *Chilotraea infuscatella* Sn.	*Argyria sticticraspis* Hmps. *A. coniorta* Hmps. *Diatraea sticticraspis* Hmps.	Early shoot borer (India)	Sugarcane, Italian millet
8. *Girhardia tauromma* Kapur	*Chilo torrentellus* Meyr. (India)	—	*Rorhi Batri* (*Saccharum spontaneum*)
9. *Proceras indicus* Kapur	*Diatraea venosata* Wlk. (India)	Internodal borer	Sugarcane

*Extract from "Lepidopterous Stalk Borers of Tropical Graminaceous Crops" by W. F. Jepson, Commonwealth Inst. Entomology, pp. 8-10, 1954.

1	2	3	4
10. *Procsras sacchariphagus* Bojer	*Diatraea venosata* Wlk. (India, Mauritius)	Spotted borer (Mauritius)	Sugarcane
Anerastiinae			
11. *Emmalocera depressella* Swinh.	*Polyocha saccharella* Dyar	Root borer	Sugarcane
Schoenobiinae			
12. *Schoenobius incertulas* Wlk.	*S. incertellus* Wlk. (Before 1934)	Yellow stem borer Rice stem borer	Rice
	S. bipunctifer Wlk. (Current)	Paddy stem borer	
13. *Scirpophaga nivella* F.	*S. auriflua* Zell. *S. rhodoproctalis* Hmps. *S. xanthogastrella* Wlk.	Top borer	Sugarcane
Agrotidae (Noctuidae)			
Amphipyrinae			
14. *Sesamia inferens* Wlk.	—	—	All graminaceous crops
15. *Sesamia uniformis* Dudgn.	—	—	Sugarcane, maize and *kanra*.

A BRIEF REVIEW OF PLANT PROTECTION WORK IN MYSORE STATE DURING 1952-53

By

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During the year under review there was no large scale outbreak of any serious insect pest in the state. The following brief report indicates the various pests and diseases of several crops and their control.

Paddy. 5,273 acres of paddy were infested with rice case worm (*Nymphula depunctalis* Guen.), the paddy green beetle (*Leptispa pygmaea* Baly.), the paddy stem borer (*Schoenobius bipunctifer* Wlk.), the paddy swarming caterpillar (*Spodoptera mauritia* Boisd.), the rice grasshopper (*Hieroglyphus banian* Fabr.) and the paddy gallfly (*Pachydiplosis oryzae* Wood-Mason). The rice caseworm, though appeared on a mild scale spread over large areas of paddy crop and was controlled by flooding the affected plots with water, having a thin film of kerosene oil on the surface of water and dislodging the caterpillars by means of a rope. In place of kerosene oil, heavy transformer oil was similarly used in controlling paddy green beetle. In each case the oil was used at the rate of one gallon per acre. The incidence of the paddy stem borer, the paddy swarming caterpillar, the paddy gall-fly and the rice grasshopper was less than that of rice case-worm and of paddy green beetle. Prompt uprooting, destruction of infested plants and setting up light traps brought the paddy stem borer and gall-fly under check. Against the paddy swarming caterpillar and rice grasshopper dusting 5% Benzene hexachloride at the rate of 20 lbs. per acre was effective.

The blast disease (*Piricularia oryzae* Cav.) on paddy was noticed in 705 acres and was controlled by dusting with fine sulphur dust at the rate of 20 pounds per acre.

Ragi (*Eleusine corocana*). 2,163 acres of *ragi* were subject to the attack of a few insect pests. The ragi cutworms (*Laphygma exigua* Hb. and *Euxoa segetis* Schiff.) caused fairly severe damage and they were controlled in 717 acres of infested area by dispersing Sodium silicofluoride bait (1 lb. in 8 seers of rice husk and 2 lbs. of jaggery with water sufficient to moisten). Among the other insect pests that attacked *ragi* crop, the *ragi* stem borers (*Sesamia inferens* Wlk. and *Saluria inficita* Wak.) caused appreciable damage particularly to the irrigated fields. Light earthing up of young seedlings two to three weeks after transplanting and systematic collection and destruction of all dead hearts served as good preventive measures. Steeping of seedlings in a solution of DDT 50% wettable powder (Guesarol 550) at the rate of one pound in 16 gallons of water, just before transplanting, was found to be effective against the borers. The webbing caterpillar (*Stenachroia elongella* Hamps.), painted bug (*Bagrada cruciferarum* Kirk.) and red hairy caterpillar (*Amsacta albistriga* Wlk.) were noticed in a mild

form. They were promptly controlled by dusting the infested crop with 5% Benzene hexachloride dust at the rate of 20 pounds per acre.

Jola (*Andropogon sorghum*). 1235 acres of *jola* crop were infested with the earhead bug (*Calocoris angustatus* Leith.), webbing caterpillar (*Stenochroia elongella* Hamps.), the gram caterpillar (*Heliothis obsoleta* Fab.), the stem borers (*Sesamia inferens* Wlk. and *Chilo zonellus* Swinh.), the *jola* Agromyzid fly (*Atherigona indica* Mall.) and mites (*Paratetranychus indicus* Hirst.). Dusting with 5% BHC at the rate of 20 pounds per acre gave good control of the earhead bug, webbing caterpillar, the gram caterpillar and the *jola* Agromyzid fly. In all 807 acres were cleared. Against stem borers systematic collection and destruction of infested portions of stalks were adopted. In controlling the *jola* mite, dusting with sulphur dust (1 part in 4 parts of wood ash) at the rate of 20 pounds per acre was found effective.

A mild infection of the grain smut (*Sphacelotheca sorghi* Link) was also observed. To overcome this disease, seed disinfection by immersing in 1% Copper sulphate solution (2 ozs. in 1½ gallons of water) for 15 minutes and drying before sowing was advised and 2,64,000 lbs. seed *jola* were disinfected.

Castor. There was an out-break of castor semilooper (*Achaea janata* Lin.) in 1050 acres of castor crop. Incidence of the pest was rather severe and infestation over 513 acres was controlled by spraying with 50 gallons of Calcium arsenate solution (1 lb. Calcium arsenate 2 lbs. of lime and 3 lbs. of jaggery in 50 gallons of water). 5% BHC dust at the rate of 25 lbs. per acre was found effective against castor semilooper giving 100% mortality.

Cotton. 215 acres of cotton were infested with spotted boll worms (*Earias fabia* Stoll., and *E. insulana* Boisd.), the pink boll-worm (*Platyedra gossypiella* Saund.), the red cotton bug (*Dysdercus cingulatus* Fab.) and *Aphis gossypii* Glov. The attacked bolls were removed and destroyed. Against the red bug and aphis BHC 5% dusting was adopted. A total area of 47 acres was treated.

Vegetables. 1,032 acres of vegetable crops like brinjal, chillies, beans, cabbage etc. were infested with aphis, thrips, cutworms, mealybugs and sawfly. Their incidence was moderate. The cutworms were controlled by dispersing Sodium silicofluoride poison bait (1 lb. in 8 seers of rice husk and 2 lbs. of jaggery with sufficient water to moisten) in the infested area. Hongey oil rosin soap (1 lb. in 8 gallons of water) was sprayed against aphis, thrips and mealy bugs. The sawfly caterpillars on cabbage were checked by adopting dusting with 5% BHC. In all, 933 acres of infested vegetable crops were treated.

Pulses. *Dolichos lablab* and Bengal gram were attacked by pod borers (*Adisura atkinsoni* Moore and *Heliothis obsoleta* Fab.) in 685 acres. The borers were controlled by dusting with 5% DDT at the rate of 20 lbs. per acre.

Fruit Plants. 4,010 infested mango trees were sprayed with DDT 50% wettable powder (Guesarol 50) at the rate of 1 lb. in 20 gallons of water against mango hoppers (*Idiocerus* sp.). *Helopeltis antonii* Sign. that caused scab on guava fruit was controlled by dusting with 5% BHC. In all 4075 guava plants were dusted.

Potato. 200 acres of potato crop were affected by Epilachna beetle (*Epilachna vigintioctopunctata* Fab., painted bug (*Bagrada cruciferarum* Kirk.) and by the disease, early blight (*Alternaria solani*). Among the pests Epilachna was in a severe form and was controlled by spraying Calcium arsenate solution (1 lb. of Calcium arsenate, 2 lbs. of lime and 3 lbs. of jaggery in 50 gallons of water). The painted bug was controlled by dusting 5% BHC.

Sugarcane. Early shoot borer (*Chilotraea infuscatella* Sn.), the top shoot borer (*Scirpophaga nivella* Fab.) and rodents attacked sugarcane crop in about 21 acres. In a large sugarcane tract at Mandya area *Trichogramma minutum* Riley, the egg parasite of the stem borer was released. Systematic collection of egg masses and "dead-hearts" and light earthing up in the early stages were adopted as control measures against the borers. Cyanogassing the rat burrows in the infested field *bunds* controlled the rats.

Palm trees. Coconut and arecanut plants were infested with Anaberoga (*Ganoderma lucidum*). Use of fine sulphur dust at half to one pound per arecanut plant and 3 to 5 lbs. per coconut tree, around the affected trees was adopted against Anaberoga. The rhinoceros beetle (*Oryctes rhinoceros* Linn.) that attacked coconut trees was controlled by hooking the adult beetles in holes by means of sharply pointed iron hooks and killing them and filling up the hole with a mixture of sand and salt. The aphis (*Cerataphis lataniae* Boisd.) that appeared on areca palms was effectively checked by spraying Hongey oil rosin soap (1 lb. in 8 gallons of water.) 18,2 areca and coconut palm trees were treated against the above pests and diseases.

Groundnut. *Aphis laburni* Kalt and leaf mining caterpillar (*Stomopteryx nerteria* M.) were noticed on groundnut crop in about 110 acres and they were controlled by dusting the infested crop with 5% BHC.

IMPORTATION OF PLANTS BY AIR INTO INDIA

According to the Government of India's "Destructive Insects and Pests Act of 1914", the import of plants or plant products by air into India is totally banned. With the development of air transport services and increase in air traffic, this restriction has out-lived its utility. The import of plants for introduction or experimental purposes is essential for the development of agriculture and forestry of this and indeed of any other country. The Government of India have, therefore, amended the regulations, in the first instance permitting import of plants by any institution or organisation under the control of the Central Government or the State Governments. The relevant paragraph 3 of Notification No. F. 320-35-A, dated the 20th July, 1936, containing rules for regulating the import of plants, etc., into India now reads as follows :

"No plant shall be imported into India by air, provided that plants which are infested with living insects and are intended for the introduction of such living insects may be so imported if they are accompanied by a special certificate from the Head of Division of Entomology, Indian Agricultural Research Institute, or the Forest Entomologist, Forest Research Institute, Dehra Dun, certifying that such plants are imported for the purpose of introducing such insects.

Provided further that plants required for the purpose of research and propagation by any institution or organisation under the control of Central Government or the State Governments may be so imported only at the airport of Bombay or Madras, if such plants are :—

(*i*) fumigated before export;

(*ii*) packed in a container which shall not enable insects either to enter therein or to escape therefrom ;

(*iii*) accompanied by an official phytosanitary certificate in the Form prescribed in the Third Schedule appended hereto ;

(*iv*) inspected and fumigated, if necessary, on arrival at the airport of Bombay or Madras, as the case may be ;

subject to the condition that such institution or organisation shall furnish to the Collector of Customs concerned at least fifteen days in advance of the expected date of arrival, particulars of the consignment.

Provided also that the import by air from Afghanistan of fruits and vegetables intended for consumption may be permitted after fumigation at the airport at Amritsar, or at the Sewri Quarantine Station, Bombay, on the condition that the importer pays a fee of Rs. 1/8/- (Rupee one and annas eight only) per maund to the Plant Protection Adviser to the Government of India, to meet the cost of fumigation, and also acts in accordance with such instructions as may from time to time be issued by that officer."

SHORT NOTES

Factors Relating to the Forecast on Outbreaks of the Rice Bug

The Rice bug, *Leptocorisa varicornis* Fabr., is a major pest of the paddy crop in all the rice-growing areas of India. It is most injurious during grain forming stage of the paddy as it sucks the milky juice of developing seeds and renders them hollow and dry. It attacks the summer and early varieties of paddy and the period of its activity lasts till the end of October. Consequently the *Aman* paddy, which matures in November, remains free from the attack of this pest. Sometimes the pest appears in an epidemic form over a wide area, as happened in Bihar in September-October 1952, when several adjoining States were simultaneously attacked by the pest. A forecast warning about the impending outbreak of the pest in Bihar was issued by the writer as early as the first week of July 1952, which subsequently proved to be correct. This warning was based on field studies carried out on the secondary host-plants of the pest.

During the course of intensive field studies, a number of secondary host-plants of the pest were found. These were *Sama* grass, *Panicum crus-galli L.*; *Gundli*, *Panicum miliare* Lamk.; *Kauni*, *Setaria italica* Beauv.; *Bajra*, *Pennisetum typhoideum* Rich.; *Juar*, *Sorghum vulgare* Pers; *Marua*, *Eleusine corocana* Gaertn. and *Bhant* bush, *Clerodendron infortunatum* Gaertn. The pest is found in the field on the wild grass, *Sama*, from the end of March until June, when it spreads to the millets, *Gundli*, *Kauni* and *Marua*—the minor economic crops. Observations have shown that in a year when there are intermittent showers of rain in April-May, together with high temperature (85° to 100°F), this grass and millets thrive well and afford good food to the pest. The pest multiplies heavily and gets a good shelter in the luxuriant growth of the *Sama* grass during the scorching heat of the summer. It then migrates to the millets, breeds further and spreads to the paddy fields with the advent of the monsoon. The summer paddy, particularly in the area near the Gangetic belt, has been noticed to be the first victim.

This heavy multiplication of the rice bug is, however, not noticed when the summer is a mild one, with very little or no rain. There are usually one or two mild rains in summer in Bihar. The pest activity comes to an abrupt end if there be a heavy rain in the first week of October ushering the cold days somewhat earlier, as it happened in 1952.

During the whole of winter and spring months, the pest is found hibernating, in adult form, on the wild bush, *Bhant*, *Clerodendron infortunatum*.

A.C. Sen
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Sabour

Diseases of Paddy in Madhya Bharat in 1953-54

The area under paddy (*Oryza sativa*) is not much as compared to other food crops in Madhya Bharat. It is grown in the northern districts of Bhind and Gird where facilities for canal irrigation exist. In the central and southern parts of Madhya Bharat it is grown mainly as a rain-fed crop.

During recent years the following diseases have been observed in the rice areas of Gohad and Harsi in the districts of Bhind and Gird.

(*i*) *Sclerotium oryzae* Catt., is usually observed in the month of October when the ears begin to appear. Losses from 10-25 percent have been recorded, but in individual cases they have been recorded up to 50 percent. Nowadays, this disease is spreading throughout the rice growing areas of northern Madhya Bharat and is taking a serious toll.

(*ii*) *Helminthosporium oryzae* Breda de Hann. This disease has been recorded during 1953-54 for the first time. Prior to this, it was never observed. It makes its first appearance in the month of September and goes on increasing till the crop is harvested in the month of November/December. It involves the whole plant including the stem, ear-heads and grains. On an average 5-10 percent damage has been recorded and in severe cases the damage goes up to 25 percent.

(*iii*) *Entyloma oryzae* Syd. was observed for the first time in the Harsi canal area of Gird district in September, 1953.

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NOTES AND NEWS

1. PROBLEMS OF NEW INSECTICIDES[1]

The sixth Commonwealth Entomological Conference devoted its first working sessions to that aspect of applied entomology—the use of powerful insecticides in farming—which has shown the most striking advances since the previous conference in 1948. In these six years, the chemical industry has spent much money on research in producing synthetic substances that kill insects by contact and there has been corresponding improvements in methods of applying them in the field. These recent developments were reviewed with contributions by speakers from Kenya and Tanganyika on the use of aircraft in applying insecticides against locusts and tsetse flies. Consideration was also given to difficulties arising from the use of the powerful new poisons. By killing beneficial as well as harmful insects they may possibly cause renewed outbreaks of a particular pest when the use of them has ceased, or stimulate other injurious insects hitherto held in check. In some situations, again, new strains of pests resistant to the insecticide may appear.

(Times London, 9-7-'54)

2. INSECTICIDAL RESIN GIVES TWO YEAR IMMUNITY FROM INSECT PESTS[2]

An effective method of insect control is being used in British cargo ships. It involves spraying infested surfaces with a lacquer containing the insecticide dieldrin. Such a lacquer is Ripolac. This sets in about 30 minutes giving a hard glassy surface with an insecticidal activity that is claimed to last for over 2 years.

Microscopic crystals of the insecticide form on the hardened surface of the lacquer and stick to the feet of insects as they alight on it. The insecticide is so powerful (in some cases as much as 200 times as toxic as DDT) that even a few crystals picked up will eventually kill the insect. This means that momentary contact only is necessary. The lacquered surface can be washed repeatedly with detergent without losing insecticidal activity. Economical use of lacquer is appreciably assisted by a knowledge of the life history of the pest. For example, cockroaches like dark sheltered niches and for their destruction the lacquer should be applied to corners, cracks and the under surfaces of furniture.

3. INSECTICIDES AND SOIL FERTILITY[3]

Fears have been expressed that insecticide spraying may impair soil fertility by destroying mirco-organisms which break down materials into plant nutrients or have other effects beneficial to crops. The risk is not a considerable one, according to W.B. Bolten, H.E. Morrison and H.H.

1. Extract from Science News Letter No. 167, issued by the Scientific Adviser, India House, London.

2. Extract from Science News Letter No. 170, issued by the Scientific Adviser, India House, London.

3. Extract from Science News Letter No. 173, issued by the Scientific Adviser, India House, London.

Crowell, of Oregon Agricultural Experiment Station (Corvallis, Ore.). Nevertheless, the results secured in two studies are admittedly only indicative and the subject will repay deeper study.

Populations of various bacteria, Streptomyces and moulds were in some cases doubled and others reduced by as much as 80%. BHC and DDT decreased the number of moulds in several soils. In one trial aldrin decreased moulds, whilst dieldrin increased them. Chlordane, Parathion and EPN had little effect. The results were complex, but it is concluded that the various stimulating and inhibitory effects on the decomposing, ammonifying and nitrifying organisms were not sufficient to affect soil fertility.

4. VARIETAL SUSCEPTIBILITY OF SUGARCANE TO PYRILLA AND TOP BORER[1]

Varieties S.33/49 and Co. 646 were comparatively resistant to Pyrilla while Co. 620, Co. 712, Co. S.245, Co. L.9, Co. L. 29, Co. J. 32, Co. J. 33 and Co. J. 34 were highly susceptible. Co. 661, Co. 617 and Co. J. 33 were comparatively resistant while Co. 312, Co. 712 and Co. L.9 were highly susceptible to top borer.

5. RECORD OF RICE GALL FLY IN SUDAN[2]

Rice grown on an experimental scale at Malakal, Southern Sudan during 1953 suffered an attack by a Cecidomyiid fly which proved to be *Pachydiplosis oryzae* (Wood-Mason) Mani. This is the first record of its occurrence in Sudan.

1. Extract from Annual Report of the Operation of the Dept. of Agriculture, Punjab, for the year 1952-53 p.19 (1954).

2. Extract from F.A.O., Plant Protection Bulletin, Volume II, No. 8, p. 122, 1954.